

Telephone Interface II

Catalog Number 26-1171



HARDWARE

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Required Equipment:
TRS-80, Level II with 16K RAM
Expansion Interface with
RS-232-C Installed

This manual provides installation and operating instructions for the Radio Shack TRS-80 TELEPHONE INTERFACE II. The TELEPHONE INTERFACE II is used with a TRS-80 Microcomputer System to allow communications over telephone lines.

The TELEPHONE INTERFACE II is a stand-alone, acoustically coupled, FSK (Frequency Shift Keying) modem. This device forms an interface between your TRS-80 and the telephone line. The word **modem** stands for **modulator-demodulator**. A **modulator** is necessary to convert the data you type in on your Computer into audio-type signals which can be sent over the phone lines. When the audio-type signal is received at the other end of the phone line, the modem **demodulates** (converts) the signals back into digital data. Your modem is designed to operate at rates up to 300 baud on the dial-up telephone network. (Communication speed is measured in **baud**, which represents the number of signal units per second.)

The TELEPHONE INTERFACE II offers standard features such as **Answer** and **Originate** operating modes. When the modem is in the **Originate** mode, you are the party to begin all "conversations" with the remote terminal. When the modem is in the **Answer** mode, the remote terminal starts or originates the conversation.

The modem provides for communication to proceed in either of two different ways: **Half-Duplex Mode** or **Full-Duplex Mode**.

Full-Duplex means that characters typed on the keyboard are sent out of the Computer and do not appear on the Video Display and/or Printer.

Half-Duplex means that characters typed on the keyboard are not only sent out, but appear on the Video Display and/or Printer.

A special TEST mode is built into your modem so you can be sure it is functioning correctly.

For communications between computers and computer-related equipment, the most wide-spread and universal standard is the EIA RS-232-C. This standardized method was adopted by the Electronic Industries Association to insure uniformity of interface between data communication equipment and data processing terminal equipment. The TELEPHONE INTERFACE II is designed for operation with an EIA RS-232-C Interface, such as Radio Shack's 26-1145.

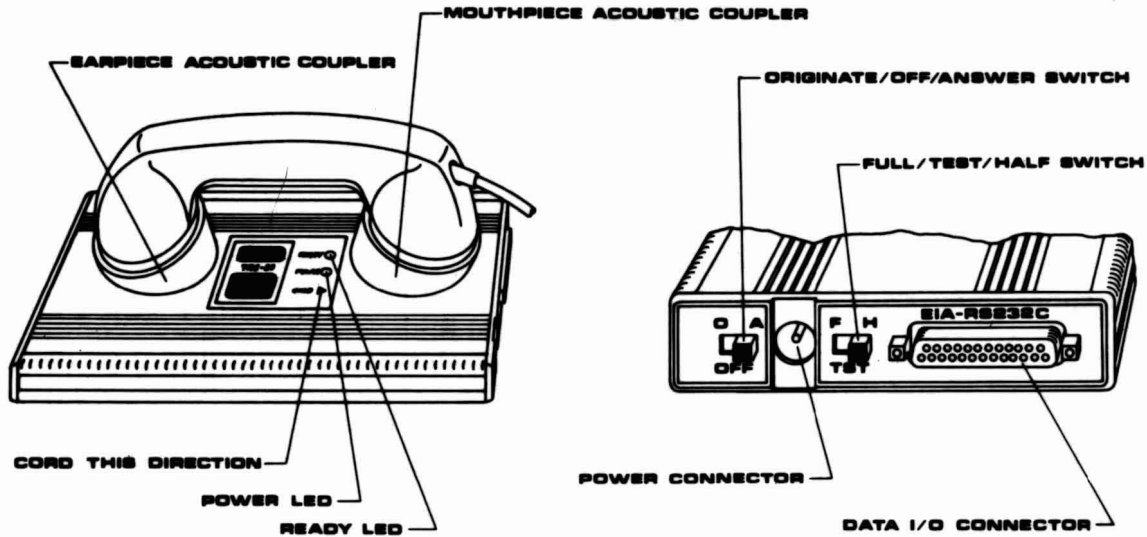
The TELEPHONE INTERFACE II is powered from a UL-listed AC Adapter. It provides a source of low voltage AC, thus eliminating hazardous high voltages inside the unit.

(Note: The TELEPHONE INTERFACE II is compatible with the Bell 103A Modem.)

SPECIFICATIONS

Receive Frequencies	Originate	
	Mark:	2225 Hz
	Space:	2025 Hz
	Answer	
Transmitter Frequencies	Mark:	1270 Hz
	Space:	1070 Hz
	Answer	
	Mark:	2225 Hz
Receive Sensitivity	Space:	2025 Hz
Temperature	Operating environment:	32–122° F
		(0–50° C)
	Storage:	–40–140° F (–40–60° C)
Humidity	Operating environment:	10–90%
	relative humidity (no	
	condensation)	
Electrical Requirements	Storage:	5–95% (no condensation)
Size	24 Volts AC, 150 mA, supplied	
	by UL-listed AC Adapter, with	
	6' cord	
Weight	2.3" x 4.7" x 10.2" (HWD)	
	(5.8 x 12 x 26 cm)	
Weight	1.5 lbs (0.68 kg)	

Controls and Indicators



Acoustic Coupler for Phone Earpiece—Telephone handset must be placed so earpiece is pressed firmly into this rubber cushion.

Acoustic Coupler for Phone Mouthpiece—Telephone handset must be placed so mouthpiece is pressed firmly into this rubber cushion.

Note: The Phone Cord should always be towards the end as indicated on the name-plate.

READY LED—will light up when the TELEPHONE INTERFACE II is ready to communicate.

POWER LED—will light up when the AC Adapter is plugged into the Power Jack on the end (and is connected to a source of 120 Volts AC power) and mode switch is not OFF.

Originate/OFF/Answer Switch—Determines the mode of operation. Set to **O** for the Originate mode. Set to **OFF** to turn the unit off (**POWER LED** will be off). Set to **A** for the Answer mode of operation.

Power Connector—Connect the AC Adapter to this jack.

Full/TEST/Half Switch—Determines duplex function. Set to **F** for full-duplex operation. Set to **TEST** for an audio self-test mode. Set to **H** for half-duplex operation.

DATA I/O Connector—This mates with the standard EIA DB-25 connector from an RS-232-C interface such as Radio Shack's 26-1145.

INSTALLATION

1. Set **O/OFF/A** Switch to OFF.
2. Plug AC Adapter into a source of 120 Volts, 60 Hz AC power. Connect the other end to the Power connector on the end of the TELEPHONE INTERFACE II.
3. Connect the cable from the RS-232-C Interface to the **DATA I/O** connector.
4. Set **F/TEST/H** switch to the desired duplex mode (or Test mode if desired).
5. Set **O/OFF/A** switch to Originate or Answer as desired. The **POWER LED** will light up.

OPERATION

Originate Mode

1. Set **O/OFF/A** to O and **F/TEST/H** as required.
2. Establish contact with the remote terminal (dial number, assure a good, noise-free phone connection, etc.).
3. Press the telephone handset firmly into the acoustic coupler cushions, with the cord positioned as labeled (**PHONE CORD ►**).
4. When the **READY LED** comes on, the TELEPHONE INTERFACE II is ready to handle data communications.
5. Proceed with data communications.

Answer Mode

1. Answer the telephone (call from remote terminal). Assure that the phone connection is a clear, noise-free one. Obtain or deliver appropriate voice instructions.
2. Set **O/OFF/A** to **A** and **F/TEST/H** as required.

Note: In Answer mode, you'll hear a tone at all times, with or without **READY LED** being lit.

3. Press the telephone handset firmly into the acoustic coupler cushions, with the cord positioned as labeled (**PHONE CORD ►**).
4. When **READY LED** comes on, proceed with normal data exchange.

To terminate a call, set **O/OFF/A** to **OFF** and hang up the telephone.

Test Mode

The Test mode is designed to verify that the **TELEPHONE INTERFACE II** is functioning correctly. It does this by switching the transmitter channel frequencies to match the receiver frequencies. All data into the modem is looped back into the Computer for verification. It requires a telephone handset to provide an isolated acoustic path between earpiece (transmitter) and mouthpiece (receiver).

Originate

In this sequence, the Computer should be set up for full duplex operation. Set **TELEPHONE INTERFACE II** to **Originate** and use **TEST** position of **F/TEST/H** switch. You will hear a tone from the earpiece cushion; if no tone is present, the unit is defective or the setup is incorrect.

Dial a single digit on the phone to silence the line; immediately place the handset into the rubber cushions.

Note: A quiet line is required for this test sequence. Some phone company exchanges will not maintain a quiet line situation long enough to complete the test; in such a situation, you must dial an extension or other number which can be controlled (cover the mouth-piece of this second phone to prevent background noise pickup).

Wait for the **READY LED** to come on. Type a message and the **TEST** function will display the message on the Video screen; check display for accuracy.

Answer

If modem passes the **TEST** in Originate mode, switch to the Answer mode (with handset still on the **TELEPHONE INTERFACE II**).

When **READY LED** comes on, type a message and it should be displayed on the Video screen.

Note: If the **READY LED** comes on in both Answer and Originate modes, but no message (or incorrect message, such as double characters) appears on the Video screen, the RS-232-C or cables or the Expansion Interface may be at fault. If the Computer can be put into an “echo” mode by connecting pins 2 and 3 together at the modem end of the RS-232-C cable and the message is correct, then the **TELEPHONE INTERFACE II** is at fault.

Trouble Shooting

If you have problems, the most likely cause is the phone line. Noise on the line or a weak phone line signal can often result in lost or invalid data. Try to re-dial the call to insure that the connection is noise-free and there is no interference.

If communication still can not be established and the TELEPHONE INTERFACE II checks out in the TEST mode, refer to the chart below.

Symptom	Problem/Solution
READY LED is off	<p>Is power "on"?</p> <p>Is handset properly positioned in rubber cushions (cord toward RS-232-C cable end)?</p> <p>Are mode switches set properly?</p> <ol style="list-style-type: none">1. When communicating with time-share computer, modem must be in Originate mode.2. When communicating with another TRS-80, mode selection must be agreed upon before data transmission. (One modem must be in Answer mode and other in Originate mode.)3. For data communication, duplex switch must be in either Full or Half position (not TEST).4. Is modem at the other end compatible with the TELEPHONE INTERFACE II? (See specs.) Remote modem should be either another TELEPHONE INTERFACE II, a Bell 103 or equivalent. Communication can not be established with a Bell 202 type.
Double Character Display	<p>Is system in half-duplex mode?</p> <p>If remote computer echoes all characters, the TRS-80 system must be in the Full-duplex mode.</p> <p>If communication system is half-duplex (no echo), either RS-232-C or TELEPHONE INTERFACE II (not both) must be in half-duplex.</p>

Symptom	Problem/Solution
Garbled Display	Is telephone handset firmly seated in rubber cushions? Is baud rate correct? Both local and remote computer systems must send data at the same rate (300 baud or less). Is received signal too weak or noisy? Pick up hand-set and listen for a clean tone (If remote modem is in answer mode). If additional tones, dialing pulses, static noise or voice sounds are present, data may be garbled. Re-place the call.

Data Interface

The TELEPHONE INTERFACE II provides an RS-232-C interface via a standard 25-pin female D-connector (labeled: DATA I/O). The table below lists the signals used by the TELEPHONE INTERFACE II.

Outputs: Mark (Off): -8V
Space (On): +10V
Inputs: Mark (Off): -3 TO -25V
Space (On): +3 TO +25V

Pin Connections			
	Function		Signal Direction
2 BA	Transmit Data		Input to modem
3 BB	Receive Data		Output to computer
5 CB	Clear to Send (On with Carrier Detect)		Output to computer
6 CC	Data Set Ready (ON with Carrier Detect)		Output to computer
7 AB	Signal Ground		Output to computer
8 CF	Carrier Detect		Output to computer

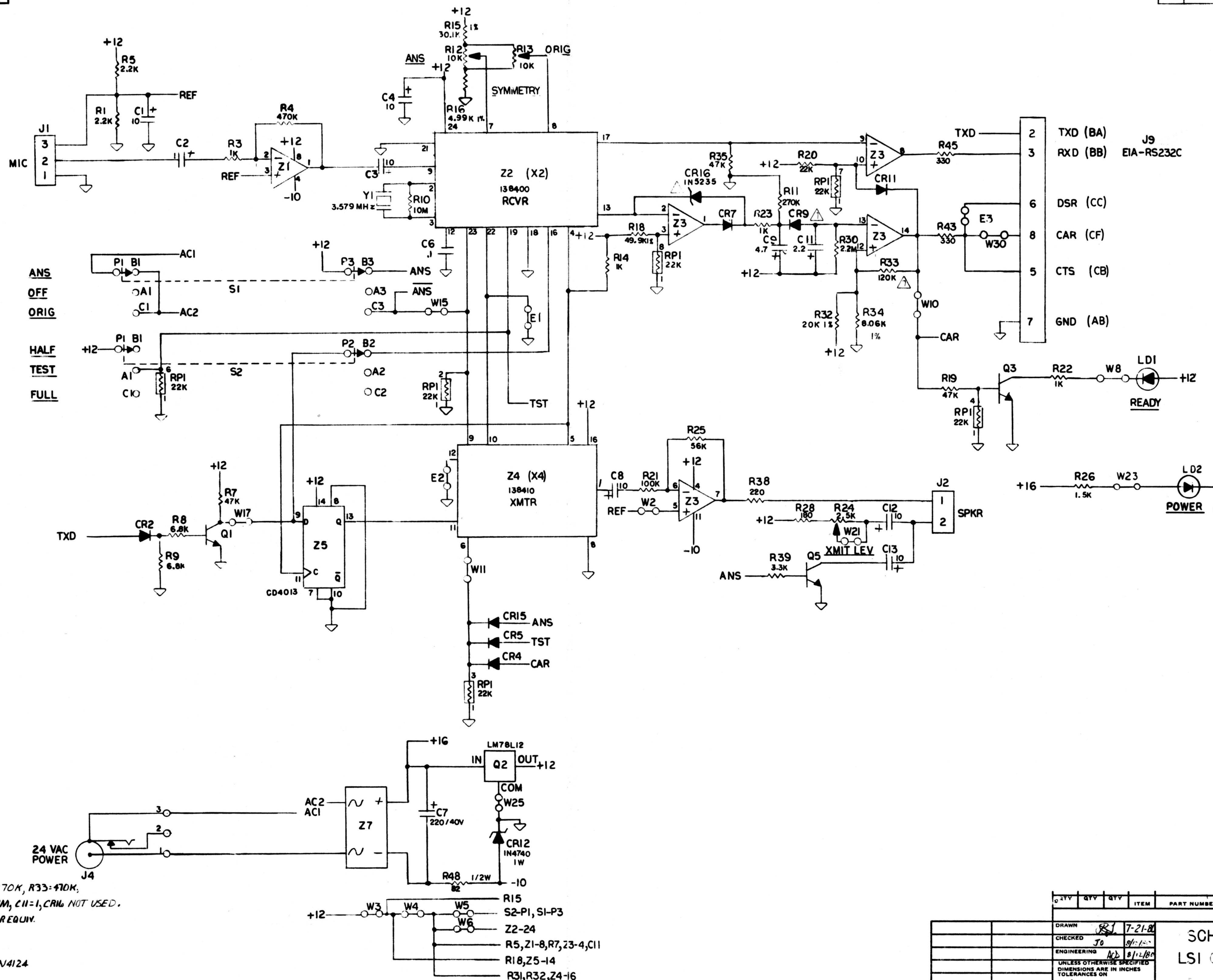
Service Policy

Radio Shack's nationwide network of service facilities provides quick, convenient, and reliable repair services for all of its computer products, in most instances. Warranty service will be performed in accordance with Radio Shack's Limited Warranty. Non-warranty service will be provided at reasonable parts and labor costs.

Because of the sensitivity of computer equipment, and the problems which can result from improper servicing, the following limitations also apply to the services offered by Radio Shack:

1. If any of the warranty seals on any Radio Shack computer products are broken, Radio Shack reserves the right to refuse to service the equipment or to void any remaining warranty on the equipment.
2. If any Radio Shack computer equipment has been modified so that it is not within manufacturer's specifications, including, but not limited to, the installation of any non-Radio Shack parts, components, or replacement boards, then Radio Shack reserves the right to refuse to service the equipment, void any remaining warranty, remove and replace any non-Radio Shack part found in the equipment, and perform whatever modifications are necessary to return the equipment to original factory manufacturer's specifications.
3. The cost for the labor and parts required to return the Radio Shack computer equipment to original manufacturer's specifications will be charged to the customer in addition to the normal repair charge.

REV	DESCRIPTION	DATE	APPROVED
A	PRODUCTION RELEASE	8/1/80	8/1/80
B	REVISED PLR PDC 1743	03-0-75-80	8/2/80



ON REV. A PCB: R11=270K, R33=470K,
R34=10K 1%, R30=2.7M, C11=1, CR16 NOT USED.

6. Z7= VMDB (VARU) OR EQUIV.

5. Z3= LM324 OR EQUIV.

4. Z1= RC4558 OR EQUIV.

3. ALL TRANSISTORS 2N4124

2. ALL DIODES 1N4148

1. ALL RESISTORS 1/4 W 5%

NOTES: UNLESS OTHERWISE SPECIFIED

QTY	QTY	ITEM	PART NUMBER	VENDOR	REF DESIG	DESCRIPTION
LIST OF MATERIALS						
DRAWN	7-21-80	7-21-80				
CHECKED	Jo	8/1/80				
ENGINEERING	Ap	8/1/80				
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON						
3 PLACE DEC	±.010					
2 PLACE DEC	±.03					
ANGLES	±1/2°					
400101						
NEXT ASSY	USED ON					
APPLICATION						
SURFACE ROUGHNESS						
SCALE: NONE						
SHEET 1 OF 1						

SCHEMATIC
LSI CAT MODEM

NOVATION, INC.
TARZANA, CALIF.

D 450101 REV. B

Representative schematic-circuitry subject to change without notice.
For up-to-date technical information, customers
may purchase the Radio Shack service manual for this product.

LIMITED WARRANTY

Radio Shack warrants for a period of 90 days from the date of delivery to customer that the computer hardware described herein shall be free from defects in material and workmanship under normal use and service. This warranty shall be void if this unit's case or cabinet is opened or if the unit is altered or modified. During this period, if a defect should occur, the product must be returned to a Radio Shack store or dealer for repair. Customer's sole and exclusive remedy in the event of defect is expressly limited to the correction of the defect by adjustment, repair or replacement at Radio Shack's election and sole expense, except there shall be no obligation to replace or repair items which by their nature are expendable. No representation or other affirmation of fact, including but not limited to statements regarding capacity, suitability for use, or performance of the equipment, shall be or be deemed to be a warranty or representation by Radio Shack, for any purpose, nor give rise to any liability or obligation of Radio Shack whatsoever.

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06-81

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U.S.A.: FORT WORTH, TEXAS 76102
CANADA: BARRIE, ONTARIO L4M 4W5

TANDY CORPORATION

AUSTRALIA

280-316 VICTORIA ROAD
RYDALMERE N S W 2116

BELGIUM

PARC INDUSTRIEL DE NANINNE
5140 NANINNE

U K

BILSTON ROAD WEDNESBURY
WEST MIDLANDS WS10 7JN